

WHAT IS CLAIMED IS:

1. A method of covalently bonding a ligand to a substrate, said method comprising:
  - (a) providing a substrate having a surface displaying olefin functional groups;
  - (b) converting said olefin functional groups to ligand reactive functional groups that covalently bond to said ligand upon contact with said ligand; and
  - (c) contacting said surface with said ligand to covalently bond said ligand to said substrate.
2. The method according to Claim 1, wherein said method is a method of producing an array of at least two different ligands covalently bonded to a surface of a substrate, and said step (c) comprises contacting said surface with said at least two different ligands.
3. The method according to Claim 2, wherein said olefin functional groups consist of a single site of unsaturation.
4. The method according to Claim 3, wherein said ligands are polymers.
5. The method according to Claim 4, wherein said polymers are nucleic acids.
6. The method according to Claim 4, wherein said polymers are peptides.
7. A method of producing an array of at least two different polymer ligands covalently attached to a surface of a substrate, said method comprising:
  - (a) providing a substrate having a surface displaying olefin functional groups that consist of a single site of unsaturation;
  - (b) converting said olefin functional groups to ligand reactive functional groups that produce covalent bonds with said at least two different polymer ligands upon contact with said ligands; and

(c) contacting said surface with said at least two different polymer ligands to covalently bond said at least two different polymer ligands to said surface and produce said array.

8. The method according to Claim 7, wherein said polymer ligands are nucleic acids.

9. The method according to Claim 7, wherein said polymer ligands are peptides.

10. The method according to Claim 7, wherein said contacting step (c) comprises depositing each of said at least two different polymer ligands in a different region of said surface.

11. The method according to Claim 7, wherein said ligand reactive functional group produced by said converting step (b) is an aldehyde.

12. The method according to Claim 11, wherein said aldehyde is a benzaldehyde.

13. The method according to Claim 7, wherein said ligand reactive functional group produced by said converting step (b) is an activated carboxylate ester.

14. The method according to Claim 7, wherein said ligand reactive functional group produced by said converting step (b) is an amine

15. The method according to Claim 7, wherein said ligand reactive functional group produced by said converting step (b) is an imidazolyl carbamate.

16. A method of producing an array of at least two different nucleic acids covalently attached to a surface of a substrate, said method comprising:

(a) providing a substrate having a surface displaying olefin functional groups that consist of a single site of unsaturation;

(b) converting said olefin functional groups to reactive functional groups that produce covalent bonds with said at least two different nucleic acids upon contact with said nucleic acids; and

(c) depositing each of said least two different nucleic acids onto different regions of said surface to covalently bond said at least two different nucleic acids to said surface and produce said array.

17. The method according to Claim 16, wherein said nucleic acids are oligonucleotides.

18. The method according to Claim 16, wherein said nucleic acids are polynucleotides.

19. The method according to Claim 18, wherein said polynucleotides are cDNAs.

20. The method according to Claim 16, wherein said ligand reactive functional group produced by said converting step (b) is an aldehyde.

21. The method according to Claim 20, wherein said aldehyde is a benzaldehyde.

22. The method according to Claim 16, wherein said ligand reactive functional group produced by said converting step (b) is an activated carboxylate ester.

23. The method according to Claim 16, wherein said ligand reactive functional group produced by said converting step (b) is an amine.

24. The method according to Claim 16, wherein said ligand reactive functional group produced by said converting step (b) is an imidazolyl carbamate.

25. A ligand array produced according to the method of Claim 7.

26. A nucleic acid array produced according to the method of Claim 16.

27. A method of detecting the presence of an analyte in a sample, said method comprising:

- (a) contacting a sample suspected of comprising said analyte with a ligand array according to Claim 25;
- (b) detecting any binding complexes on the surface of the said array to obtain binding complex data; and
- (c) determining the presence of said analyte in said sample using said binding complex data.

28. The method according to Claim 27, wherein said ligand array is a nucleic acid array.

29. The method according to Claim 28, wherein said analyte is a nucleic acid.

30. A hybridization assay comprising the steps of:

- (a) contacting at least one labeled target nucleic acid sample with a nucleic acid array according to Claim 26 to produce a hybridization pattern; and
- (b) detecting said hybridization pattern.

31. The method according to Claim 30, wherein said method further comprises washing said array prior to said detecting step.

32. The method according to Claim 30, wherein said method further comprises preparing said labeled target nucleic acid sample.

33. A kit for use in a hybridization assay, said kit comprising:  
a nucleic acid array according to Claim 26.

34. The kit according to Claim 33, wherein said kit further comprises reagents for generating a labeled target nucleic acid sample.

35. The kit according to Claim 34, wherein said kit further comprises an aqueous solution.

36. A method of producing a surface modified substrate, said method comprising:

- (a) providing a substrate having a surface displaying olefin functional groups;
- (b) converting said olefin functional groups to ligand reactive functional groups that covalently bond to a ligand upon contact with a ligand.

37. The method according to Claim 36, wherein said olefin functional groups consist of a single site of unsaturation.

38. A method of covalently bonding a ligand to a substrate, said method comprising:

- (a) providing a substrate producing according to the method of Claim 36; and
- (b) contacting said surface with said ligand to covalently bond said ligand to said substrate.

39. The method according to Claim 38, wherein said method is a method of producing an array of at least two different ligands covalently bonded to a surface of a substrate, and said step (b) comprises contacting said surface with said at least two different ligands.

40. The method according to Claim 38, wherein said olefin functional groups consist of a single site of unsaturation.

41. The method according to Claim 40, wherein said ligands are polymers.

42. The method according to Claim 41, wherein said polymers are nucleic acids.

43. The method according to Claim 41, wherein said polymers are peptides.

44. A method according to claim 7 additionally comprising, following exposure of the array to a sample:  
reading the array.

45. A method comprising forwarding data representing a result of a reading obtained by the method of Claim 44.

46. A method according to Claim 45 wherein the data is transmitted to a remote location.

47. A method comprising receiving data representing a result of an interrogation obtained by the method of Claim 44.

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